

CLAIMS

1 2 1. A liquid toner for electrostatic imaging which
2 comprises:

3 an insulating non-polar carrier liquid;
4 at least one charge director; and
5 toner particles dispersed in the carrier liquid, the
6 particles comprising:

7 a core material comprising a pigmented polymer
8 which is unchargeable or weakly chargeable by the at least
9 one charge director, but which is otherwise suitable for use
10 as a toner material; and

11 12 a coating of at least one ionomer component in
13 an amount effective to impart enhanced chargeability to the
14 ordinarily unchargeable or weakly chargeable particles.
15

16 2. A liquid toner for electrostatic imaging which
17 comprises:

18 an insulating non-polar carrier liquid;

19 at least one charge director; and

20 toner particles dispersed in the carrier liquid, the
21 toner particles comprising:

22 a core material which is chargeable to a first
23 polarity by the at least one charge director; and

24 a coating of at least one ionomer component in
25 an amount effective, together with the at least one charge
26 director, to impart a charge having a polarity different
27 from the first polarity to the coated particles.
28

29 3. Liquid toner according to claim 1 or claim 2, wherein
30 the particles are synthetic resin particles.
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32 4. Liquid toner according to any of the preceding claims
33 wherein the ionomers are carboxylic acid based and
34 neutralized with metal salts forming ionic clusters.
35

36 5. Liquid toner according to any of claims 1-3 wherein
37 the ionomers are acrylic acid based and neutralized with
38 metal salts forming ionic clusters.

1
2 6. Liquid toner according to any of claims 1-3 wherein
3 the ionomers are sulfonic acid based and neutralized with
4 metal salts forming ionic clusters.

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6 7. Liquid toner according to any of claims 1-3 wherein
7 the ionomers are phosphoric acid based and neutralized with
8 metal salts forming ionic clusters.

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10 8. Liquid toner according to any of claims 1-3 wherein
11 the ionomers are ethylene based and neutralized with metal
12 salts forming ionic clusters.

13
14 9. A method for producing liquid toners for electrostatic
15 imaging, which method comprises dispersing pigmented polymer
16 particles in insulating non-polar carrier liquid, and mixing
17 at least one ionomer which is not soluble at room
18 temperature with the dispersion.

19 10. A method according to claim 9 wherein the ionomer is
20 first heated to a temperature at which the ionomer dissolves
21 in the carrier liquid and then cooled to a temperature
22 whereat the ionomer is not soluble in the carrier liquid,
23 thereby coating the particles with ionomer material.

24
25 11. A method according to claim 10 wherein the mixture is
26 agitated at least during the step of cooling.

27
28 12. A method according to any of claims 9-11 and
29 comprising the step of adding at least one charge director
30 to the mixture.

31
32 13. A method according to claim 10 or claim 11 and
33 comprising the step of adding at least one charge director
34 to the mixture after the step of cooling.

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36 14. A method according to claim 12 or claim 13 wherein the
37 particles are formed of a material which in the presence of
38 charge director alone are ordinarily unchargeable or weakly

1 chargeable, but are otherwise suitable for use as a toner
2 particles, and the at least one ionomer component is used in
3 an amount effective to impart enhanced chargeability to the
4 toner particles.

5

6 15. A method according to claim 12 or claim 13, wherein the
7 at least one ionomer component is used in an amount
8 effective to reverse the polarity conventionally imparted to
9 the material of the particles by the at least one charge
10 director.

11

12 16. A method according to any of claims 9-15, wherein the
13 particles are comprised of a synthetic resin.

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15 17. A method according to any of claims 9-15 wherein the
16 ionomers are carboxylic acid based and neutralized with
17 metal salts forming ionic clusters.

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19 18. A method according to any of claims 9-15 wherein the
20 ionomers are metacrylic acid based and neutralized with
21 metal salts forming ionic clusters.

22

23 19. A method according to any of claims 9-15 wherein the
24 ionomers are sulfonic acid based and neutralized with metal
25 salts forming ionic clusters.

26

27 20. A method according to any of claims 9-15 wherein the
28 ionomers are phosphoric acid based and neutralized with
29 metal salts forming ionic clusters.

30

31 21. A method according to any of claims 9-15 wherein the
32 ionomers are ethylene based and neutralized with metal salts
33 forming ionic clusters.

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35 22. Liquid toner according to any of claims 1-8 wherein
36 the coating comprises less than 20 percent of the weight of
37 the particles.

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1 23. Liquid toner according to any of claims 1-8 wherein
2 the coating comprises less than 10 percent of the weight of
3 the particles.

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5 24. Liquid toner according to any of claims 1-8 wherein
6 the coating comprises less than 5 percent of the weight of
7 the particles.

8

9 25. Liquid toner according to any of claims 1-8 or 22-24
10 wherein the coating comprises a thickness effective in
11 improving the chargeability of the toner particles.

12

13 26. Liquid toner according to any of claims 1-8 or 22-25
14 wherein the coating comprises a thickness greater than or
15 equal to a monolayer of the ionomer.

16

17 27. Liquid toner according to claim 26 wherein the coating
18 comprises a thickness of greater than 0.02 micrometers.

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20 28. An electrostatic imaging process which comprises the
21 steps of:

22 forming a charged latent electrostatic image on a
23 photoconductive surface;

24 applying to the surface toner particles from a liquid
25 toner according to any of claims 1-8 or 22-27; and

26 transferring the resulting toner image to a substrate.

27

28 29. An electrostatic imaging process which comprises the
29 steps of:

30 forming a charged latent electrostatic image on a
31 photoconductive surface;

32 applying to the surface charged colorant particles
33 from a liquid toner prepared according to the method of any
34 one of claims 9-21; and

35 transferring the resulting toner image to a substrate.

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